CLAIMS

1. A method for purifying matter contaminated with a halogenated organic compound, which method comprises the step of:

adding a reducing agent and a nutritional source for a heterotrophic anaerobic microorganism to the contaminated matter, the reducing agent having a standard electrode potential ranging from 130 mV to -2400 mV at 25°C with respect to the standard hydrogen electrode, the reducing agent being at least one species selected from the group consisting of reduced iron, cast iron, an iron-silicon alloy, a titanium alloy, a zinc alloy, a manganese alloy, an aluminum alloy, a magnesium alloy, a calcium alloy and a water soluble compound.

2. A method of claim 1 wherein the reducing agent has a standard electrode potential ranging from -400 mV to -2400 mV at 25°C with respect to the standard hydrogen electrode, and the reducing agent is at least one species selected from the group consisting of the reduced iron, the cast iron, the iron-silicon alloy, the titanium alloy, the zinc alloy, the manganese alloy, the aluminum alloy, the magnesium alloy, and the calcium alloy.

3. A method of claim 1 wherein the reducing agent comprises the reduced iron.

4. A method of claim 1 wherein the reducing agent comprises the cast iron.

5. A method of claim 1 wherein the reducing agent is at least one species selected from the group consisting of the

iron-silicon alloy, a titanium-silicon alloy, a titanium-aluminum alloy, a zinc-aluminum alloy, a manganese-magnesium alloy, an aluminum-zinc-calcium alloy, an aluminum-tin alloy, an aluminum-silicon alloy, a magnesium-manganese alloy and a calcium-silicon alloy.

6. A method of claim 1 wherein the reducing agent is a water soluble compound.

7. A method of claim 6 wherein the reducing agent is an organic acid or derivative thereof, hypophosphorous acid or derivative thereof, or a sulfide salt.

8. A method of claim 1 wherein the reducing agent is a powder having a diameter up to 500 μm.

9. A method of claim 1 wherein the contaminated matter has a water content of at least 25 percent by weight.

10. A method of claim 1, further comprising the step of maintaining the contaminated matter in a pH ranging from 4.5 to 9.0 subsequent to the adding step.

11. A method of claim 1, further comprising the step of maintaining the contaminated matter in a pH ranging from 4.5 to 9.0 under a reducing atmosphere subsequent to the adding step.

12. A method of claim 1, further comprising the steps of adding an organic compost, a compostable organic material, a waste water containing organic matter or a waste containing organic matter to the contaminated matter and mixing thereof.

13. A method for purifying matter contaminated with a halogenated organic compound, which method comprises the step of:

adding a reducing agent to the contaminated matter, the reducing agent having a standard electrode potential ranging from 130 mV to -2400 mV at 25°C with respect to the standard hydrogen electrode, the reducing agent is at least one species selected from the group consisting of reduced iron, cast iron, an iron-silicon alloy, a titanium alloy, a zinc alloy, a manganese alloy, an aluminum alloy, a magnesium alloy, a calcium alloy, and a water soluble compound.

14. A method of claim 13 wherein the reducing agent has the standard electrode potential ranging from -445 mV to -2400 mV at 25°C with respect to the standard hydrogen electrode, and the reducing agent is at least one species selected from the group consisting of the iron-silicon alloy, the titanium alloy, the zinc alloy, the manganese alloy, the aluminum alloy, the magnesium alloy, and the calcium alloy.

15. A method of claim 14 wherein the contaminated matter comprises 0.1 g to 100 g of an iron compound based on 1 kg of a dry weight of the contaminated matter.

16. A method of claim 14 wherein the contaminated matter comprises 1 g to 100 g of an iron compound based on 1 kg of a dry weight of the contaminated matter, and the iron compound comprises iron hydroxide ($Fe(OH)_3$) or triiron tetraoxide (Fe_3O_4).

17. A method of claim 15 wherein the reducing agent is at least one species selected from the group consisting of the iron-silicon alloy, titanium-silicon alloy, titanium-aluminum alloy, zinc-aluminum alloy, manganese-magnesium

alloy, aluminum-zinc-calcium alloy, aluminum-tin alloy, aluminum-silicon alloy, magnesium-manganese alloy and calcium-silicon alloy.

18. A method of claim 13 wherein the reducing agent is a water soluble compound.

19. A method of claim 18 wherein the reducing agent is an organic acid or derivative thereof, hypophosphorous acid or derivative thereof, or a sulfide salt.

20. A method of claim 13 wherein the reducing agent is a powder having a diameter up to 500 μm.

21. A method for purifying matter contaminated with a halogenated organic compound, which method comprises the step of:

adding a reducing agent and a nutritional source for a heterotrophic anaerobic microorganism to the contaminated matter, the reducing agent having a standard electrode potential ranging from 130 mV to -2400 mV at 25°C with respect to the standard hydrogen electrode, the nutritional source containing an organic carbon and 20 to 50 percent by weight, based on the organic carbon, of an oxidized form of nitrogen.

22. A method of claim 21 wherein the nutritional source contains 20 to 30 percent by weight, based on the organic carbon, of the oxidized form of nitrogen.

23. A method of claim 21 wherein the organic carbon is supplied as a water soluble organic carbon source.

24. A method of claim 21 wherein the reducing agent is a metal having a standard electrode potential ranging from

-400 mV to -2400 mV at 25°C with respect to the standard hydrogen electrode.

25. A method of claim 21 wherein the reducing agent is at least one species selected from the group consisting of reduced iron, cast iron, an iron-silicon alloy, a titanium alloy, a zinc alloy, a manganese alloy, an aluminum alloy, a magnesium alloy, a calcium alloy and a water soluble compound.

26. A method of claim 21 wherein the reducing agent is a water soluble compound.

27. A method of claim 21 wherein the reducing agent is a powder having a diameter up to 500 μm.

28. A method of purifying a contaminated matter containing a halogenated compound and a solid matter, which method comprises the step of:

mixing a reducing agent and a nutritional liquid containing a nutritional source for a heterotrophic anaerobic microorganism and water with the contaminated matter, the reducing agent having a standard electrode potential ranging from 130 mV to -2400 mV at 25°C with respect to the standard hydrogen electrode, wherein the mixing step including a step of adjusting the contaminated matter at pH ranging from 4.5 to 9.0; and

keeping the mixture in a condition that air hardly penetrates through a matrix.

29. A method of claim 28 wherein the reducing agent is in a powder form and wherein the nutritional liquid is added to the contaminated matter and mixed thereof, and then the

reducing agent is added to the resultant mixture and further mixed thereof.

30. A method of claim 28 wherein the reducing agent is a powder having a diameter up to 500 μm.

31. A method of claim 28 wherein the reducing agent is at least one species selected from the group consisting of reduced iron, cast iron, iron-silicon alloy, titanium alloy, zinc alloy, manganese alloy, aluminum alloy, magnesium alloy and calcium alloy.

32. A method of claim 28 wherein 1 to 10 percent by volume, based on the contaminated matter, of the nutritional liquid is added to the contaminated matter and mixed thereof as a first step; and then an amount larger than the amount of the first step of the nutritional liquid is added to the contaminated matter and mixed thereof as a second step.

33. A method of claim 28 wherein:

1 to 5 percent by volume, based on the contaminated matter, of the nutritional liquid is added to the contaminated matter and mixed thereof as a first step;

the nutritional liquid is added to the contaminated matter and mixed thereof as a second step wherein a sum of the nutritional liquids added in the first step and the second step amounts 5 to 10 percent by volume, based on the contaminated matter, of the contaminated liquid; and

the nutritional liquid is added to the contaminated matter and mixed thereof as a third step wherein an amount of the nutritional liquid added in the third step is more than an amount of the nutritional liquid added in either the

first step or the second step.

34. A method of claim 28 wherein the reducing agent is a water soluble compound, and the reducing agent is dissolved in the nutritional liquid.

35. A method of claim 28 wherein in the keeping step the mixture is kept at a temperature ranging from 17°C to 60°C for at least an initial three days.